

# Module: Elective Advanced Lectures: Theoretical Physics

Module No.: physics70c

## Course: Quantum Chromodynamics (T)

Course No.: physics758

Category	Type	Language	Teaching hours	CP	Semester
Elective	Lecture with exercises	English	3+2	7	WT/ST

### Requirements for Participation:

#### Preparation:

Advanced quantum theory (physics606)  
Quantum Field Theory (physics755)

#### Form of Testing and Examination:

Requirements for the examination (written): successful work with the exercises

#### Length of Course:

1 semester

### Aims of the Course:

Understanding basic properties of Quantum Chromodynamics, ability to compute strong interaction processes

### Contents of the Course:

Quantum Chromodynamics as a Quantum Field Theory  
Perturbative Quantum Chromodynamics  
Topological objects: instantons etc.  
Large N expansion  
Lattice Quantum Chromodynamics  
Effective Field Theories of Quantum Chromodynamics  
Flavor physics (light and heavy quarks)

### Recommended Literature:

S. Weinberg; The Quantum Theory of Fields (Cambridge University Press 1995)  
M.E. Peskin, D.V. Schroeder; An Introduction to Quantum Field Theory (Westview Press 1995)  
F.J. Yndurain; The Theory of Quark and Gluon Interactions (Springer 2006)  
J.F. Donoghue et al.; Dynamics of the Standard Model (Cambridge University Press 1994)  
E. Leader and E. Predazzi; An Introduction to Gauge Theories and Modern Particle Physics (Cambridge University Press 1996)